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ABSTRACT

This packet of technology learning activity (TLA) materials for drafting for students in grades 6-10 consists of an instructor's section and student materials. The instructor's section contains background information, suggested activities, and a list of suggested resources. A lesson plan for the 8-day module includes assignments; equipment, tools, and supplies list; and facilities requirements/modifications. The following forms are provided: summary worksheet, pretest, posttest, test answers, and evaluation summary. A bibliography concludes the instructor's section. Topics are as follows: Cartesian Coordinate System, orthographic drawings, using drafting board and tools, and career search. The student section provides materials for each of the 8 days. The materials for the first day consist of the following: a summary of activities; list of all assignments in the TLA; goal; vocabulary with definitions; list of expected learner outcomes; list of objectives; list of related Technology Student Association competitive events; and academic and workplace applications reinforced by specific activities in this TLA. Materials for each of the other days may include some or all of the following: summary of activities; information sheet(s); objective with related introductory information; list of tools and materials; and procedure. An optional activity that may be completed after the posttest concludes the student section. (YLB)

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ED 380 591

# Technology Learning Activity

Technology Education Series

# DRAFTING

TLA TE-1134

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CIMC

Teacher Edition

Oklahoma Department of
Vocational and Technical Education
1500 West Seventh Avenue
Stillwater, OK 74074-4364

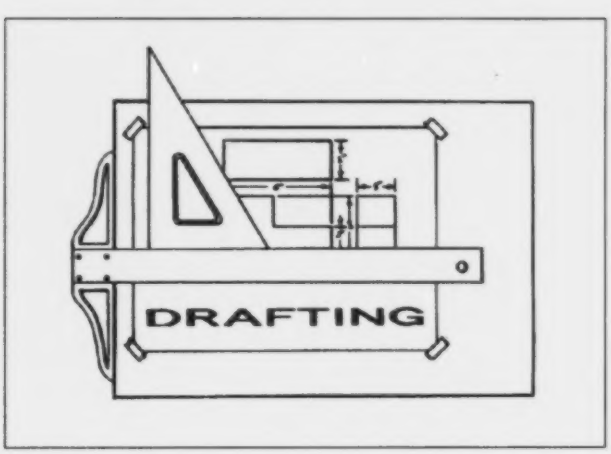
# *TECHNOLOGY EDUCATION*

# TECHNOLOGY LEARNING ACTIVITY

**TE1134**

# DRAFTING

**Suggested Time: 8 Days**




**Developed by the**
**Curriculum and Instructional Materials Center**
**for the Technology Education Division**
**Oklahoma Department of Vocational and Technical Education**

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Only through the close cooperation of the Curriculum and Instructional Materials Center staff was this curriculum developed. Sincere thanks are shared with the CIMC coordinators.

John Friedemann
CIMC Coordinator

Lynna Ausburn, Ph.D.
CIMC Development Coordinator

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*Sherry Wietelman, M.S.*
*Curriculum Development Specialist*
*Curriculum and Instructional Materials Center*

## BACKGROUND INFORMATION

"Drafting" is the name for the special style of drawing which allows inventors and builders to communicate. A "draftsperson" is the person who makes this kind of drawing.

When scientists or inventors come up with the idea for a new product, they have to find a way to change the idea into the actual product. To do this, they must be able to tell people how to build the new object.

Since the inventors can't always be present when their new products are built, especially in a large factory, they have to give the workers copies of the instructions about how to make everything and how to put the parts together.

They cannot just write out what to do, because describing all of the different parts is very hard and can be very confusing. Also, everyone might not understand exactly what the inventors mean when they use certain words or phrases.

— continued —

## INSTRUCTOR'S SECTION

## BACKGROUND INFORMATION

That is why inventors need to use technical drawings to instruct people about the way the machine is put together.

Usually, the inventor gives the sketches and a model of the invention to the draftsperson. Then the draftsperson makes exact drawings, showing the size, shape and all other important information. Finally, the drawings are given to people in the factory, who then make the product according to the information in the drawing.

It is very important that the drawings are exactly right, because just a tiny error could keep the new invention from working.

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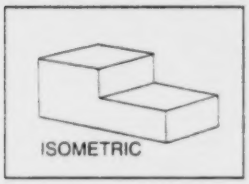
## INSTRUCTOR'S SECTION

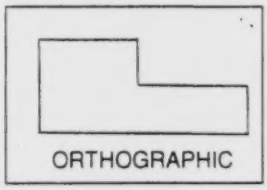
## BACKGROUND INFORMATION

## INSTRUCTOR'S SECTION

Certain standards have been developed to help draftspeople make their drawings as easily and accurately as possible. These standards include:

◆the view of the object—either isometric or orthographic




◆the way arrows are drawn
◆the way dimensions are shown
◆the lines—thin or thick, dashed or solid

ANSI (American National Standards Institute) Standards are one set of standards used in drafting to make sure the meaning of different lines in a drawing is clear to everyone who looks at it.

ANSI Line Standards

Main types of lines and purposes:

STANDARDS

◆Thick, solid—for visible edges of an object (object lines).
◆Medium, dashed—for the edges of an object you cannot see (hidden lines).
◆Thin, solid—for an imaginary line through the center of an object, and for lines showing the dimensions of an object.

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# BACKGROUND INFORMATION

Orthographic drawings are used by builders and craftspeople to help them build objects. These drawings give builders useful information.

Orthographic drawings show three separate views of an object on one sheet of paper—the front, side and top. This is why they are also called "three-view drawings." They look as though the figure was unfolded, like in this drawing.

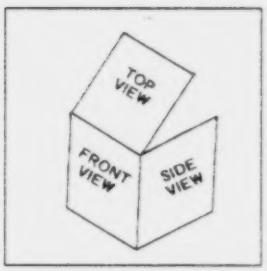
Three-view drawings make it harder to understand how the parts fit together, but easier to see how the parts actually look.

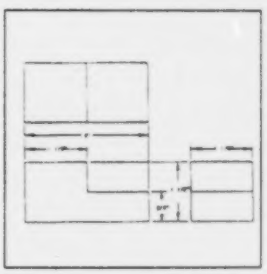
There is a standard style for orthographic drawings which the students will follow. The front view is drawn first in the lower left corner of the paper. Then the top view is drawn directly above the first. Finally, the right side view is drawn directly to the right of the front view.

Isometric drawings show how an object actually looks (it is also called 3-D). An isometric drawing is made from an angle and shows the top, side and front of an object. These drawings are used because they make it easy to see what the object really looks like.

# INSTRUCTOR'S SECTION

## DRAWING TYPES



## EXPECTED LEARNER OUTCOMES

- The student will know and appreciate the importance of technology and technological literacy.
- The student will explore career opportunities so they can make meaningful career choices.
- The student will explore future educational opportunities so they can make meaningful educational choices.
- The student will apply problem-solving and critical thinking techniques.
- The student will apply math, science, reading, and other school subjects in a practical situation.
- The student will develop basic skills in the safe and proper use of tools, machines, materials, processes, and technical concepts.
- The student will recognize and develop individual talents.
- The student will think logically and sequentially.

— continued —

## INSTRUCTOR'S SECTION

## EXPECTED LEARNER OUTCOMES

- The student will develop leadership, creative abilities, positive self-concepts, and individual potential in a technological society.
- The student will apply design, imagination and creative abilities.
- The student will become a more sophisticated consumer of the goods and services of a technological society.
- The student will develop an understanding of and the ability to adapt to those technological forces that influence life in the 21st Century.
- The student will communicate by making clear and relevant points through the development of mental process skills.
- The student will learn applications of lifelong learning skills.
- The student will think globally and act locally.

## INSTRUCTOR'S SECTION

## SUGGESTED ACTIVITIES

- ✓ Younger students may not have progressed to the level of cognitive development required for successful completion of this Technology Learning Activity (TLA). In order for this TLA to be most effective, it is recommended that group instruction be used as the method of delivery for students in grades 6 and 7. Instructors are urged to build the model from the skunk works activity and use it as a visual aid for introducing orthographic projection on Day 5.

- ✓ Use a marker to highlight the problems the student will complete in *Lines and Views*.

- ✓ Photocopy the enclosed sheet of graph paper at full size on a photocopying machine. Copy the sheet on both sides of the copy paper, if possible.

- ✓ Obtain materials to supplement TLA.

*See Suggested Resources for computer software and books to supplement this module.*

- ✓ Review instructional outline for this TLA. Modify time frames to suit class needs and plan activities for each class period.

— continued —

## INSTRUCTOR'S SECTION

## PREPARATION

## SUGGESTED ACTIVITIES

- ✓ Study the specific objectives to determine those you will cover in your presentation. Decide also which objectives should be taught to which students.
- ✓ Determine scope and sequence of objectives that you add to the TLA. Design and develop support materials, including evaluation techniques, for additional objectives.
- ✓ Determine how you will schedule time for students to demonstrate competence in the required procedures.
- ✓ Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of this TLA.

## INSTRUCTOR'S SECTION

### PREPARATION

## SUGGESTED RESOURCES

## INSTRUCTOR'S SECTION

### WORKSTATION BOOKSHELF

French, Thomas E., Carl L. Svenson, Jay D. Helsel, Byron Urbanick. *Mechanical Drawing*. Gregg Division, McGraw-Hill Publishing Company. New York, NY. 1990.

Parke, Nelson L. *Lines and Views*. Nelson L. Parke. Springfield, MO, 1984.

Walker, John R. *Exploring Drafting*. The Goodheart-Willcox Company, Inc. South Holland, IL, 1987.

Wallach, Paul. *Drafting*. Glencoe Publishing Company, Inc. Encino, CA, 1981.

### INSTRUCTOR'S REFERENCE MATERIALS

French, Thomas E., Carl L. Svenson, Jay D. Helsel, Byron Urbanick. *Mechanical Drawing*. Gregg Division, McGraw-Hill Publishing Company. New York, NY. 1990.

Walker, John R. *Exploring Drafting*. The Goodheart-Willcox Company, Inc. South Holland, IL, 1987.

Wallach, Paul. *Drafting*. Glencoe Publishing Company, Inc. Encino, CA, 1981.

| Instructional Sequence | Technology Education: Drafting | | |
|---|---|---|---|
| | **Assignments** | **Equipment, Tools, and Supplies** | **Facilities Requirements/ Modifications** |
| Day 1 | Take Pretest<br>Read Assignments to Turn In, Goal, Words You Should Know, Expected Learner Outcomes, Objectives, Related TSA Competitive Events, Academic and Workplace Applications | Computer score card sheet for Pretest<br>#2 pencil | |
| Days 2-3 | Read Information Sheet<br>Complete Objective 1: Locate points on graph paper using the Cartesian Coordinate System and draw lines between those points. | *Lines and Views*<br>No 2 pencil (medium)<br>Eraser<br>Graph paper (8.5" x 11" with ¼ inch grid): 1 sheet<br>Ruler | |
| Day 4-5 | Read Information Sheet<br>Complete Objective 2: Make and dimension orthographic drawings using ANSI line standards. | *Lines and Views*<br>No 2 pencil (medium)<br>Eraser<br>Graph paper (8.5" x 11" with ¼ inch grid): 5 sheets (front and back)<br>Ruler | |



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| Instructional Sequence | Technology Education: Drafting | | |
|---|---|---|---|
| | **Assignments** | **Equipment, Tools, and Supplies** | **Facilities Requirements/ Modifications** |
| Day 6 | Complete Objective 3: Read a rule, measure distances using your ruler, and use your drafting board and drafting tools to draw lines. | *Lines and Views*<br>No 2 pencil (medium)<br>Dusting brush (optional)<br>Eraser<br>"T" square<br>Triangle (30°/60°)<br>Drafting board<br>Graph paper (2 sheets of 8.5" x 11" with ¼ inch grid)<br>Notebook paper (2 sheets)<br>Drafting tape<br>Ruler | |
| Day 7 | Complete Objective 4: Use drafting board, "T" square, and triangle to make and dimension isometric drawings using ANSI line standards. | *Lines and Views*<br>No 2 pencil (medium)<br>Dusting brush (optional)<br>Eraser<br>"T" square<br>Triangle (30°/60°)<br>Drafting board<br>Graph paper (2 sheets of 8.5" x 11" with ¼ inch grid)<br>Plain white paper<br>Drafting tape<br>Ruler | |
| Day 8 | Read Impact Statements<br>Complete Career Search Activity, any Unfinished Assignments, Posttest<br>Skunk Works (if time) | Computer score card or sheet<br>Notebook paper (2 sheets)<br>#2 pencil | |

Equipment, Tools, and Supplies: Drafting
Summary Worksheet

| Equipment, Tools, and Supplies | Per Student | Per Period | Total Needed | Special Considerations | Cost per Student | Cost per Period | Total Cost | Special Considerations |
|---|---|---|---|---|---|---|---|---|
| #2 pencil | 1 | | | Breakage | | | | |
| Computer scan card/sheet | 1 | | | Mistakes | | | | |
| Plain white paper (8.5" x 11") | 3 | | | Mistakes | | | | |
| Dusting brush (optional) | 1 | | | | | | | |
| Eraser | 1 | | | Damage | | | | |
| "T" square | 1 | | | | | | | |
| Triangle (30°/60°) | 1 | | | | | | | |
| Drafting board | 1 | | | | | | | |
| Heavy graph paper (8.5" x 11" with ¼-inch grid) | 1 | | | Mistakes | | | | |
| Graph paper (8.5" x 11" with ¼-inch grid) | 10 | | | Mistakes | | | | |
| Notebook paper | 2 | | | Mistakes | | | | |
| Drafting tape | 1 | | | | | | | |
| Ruler (Metric) | 1 | | | | | | | |
| Ball point pen (any color) | 1 | | | Damage | | | | |
| Clear tape (¼-inch wide) | 1 | | | | | | | |



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## PRETEST

1. Orthographic drawings show _____ side(s) of an object.

   a. 1
   b. 2
   c. 3
   d. 4

2. Isometric drawings show _____ side(s) of an object.

   a. 1
   b. 2
   c. 3
   d. 4

3. Orthographic drawings do not use hidden lines.

   a. true
   b. false

4. Thin lines (light lines) are used to show the visible edges of an object.

   a. true
   b. false

5. _____ lines are used to show hidden lines.

   a. thin, dashed
   b. medium, dashed
   c. medium, solid
   d. thin, solid

— continued —

## INSTRUCTOR'S SECTION

PART 1

## PRETEST

## INSTRUCTOR'S SECTION

PART 2

6. _____ lines are used to show imaginary lines.

   a. thin, dashed
   b. medium, dashed
   c. thick, solid
   d. thin, solid

7. To draw lines in isometric drawings, you should use a "T" square and a triangle.

   a. true
   b. false

8. Horizontal lines in orthographic drawings are at 30° in isometric drawings.

   a. true
   b. false

9. The different kinds of lines used in drafting are from _____ standards.

   a. NASA
   b. SI
   c. TLA
   d. ANSI

10. Drafting is NOT used to:

    a. design computer software
    b. map country's borders
    c. design new cars
    d. make comfortable chairs

## POSTTEST

11. Orthographic drawings show _____ side(s) of an object.

    a. 1
    b. 2
    c. 3
    d. 4

12. Isometric drawings show _____ side(s) of an object.

    a. 1
    b. 2
    c. 3
    d. 4

13. Orthographic drawings do not use hidden lines.

    a. true
    b. false

14. Thin lines (light lines) are used to show the visible edges of an object.

    a. true
    b. false

15. _____ lines are used to show hidden lines.

    a. thin, dashed
    b. medium, dashed
    c. medium, solid
    d. thin, solid

— continued —

## INSTRUCTOR'S SECTION

PART 1

## POSTTEST

## INSTRUCTOR'S SECTION

PART 2

16. _____ lines are used to show imaginary lines.

    a. thin, dashed
    b. medium, dashed
    c. thick, solid
    d. thin, solid

17. To draw lines in isometric drawings, you should use a "T" square and a triangle.

    a. true
    b. false

18. Horizontal lines in orthographic drawings are at 30° in isometric drawings.

    a. true
    b. false

19. The different kinds of lines used in drafting are from _____ standards.

    a. NASA
    b. SI
    c. TLA
    d. ANSI

20. Drafting is NOT used to:

    a. design computer software
    b. map country's borders
    c. design new cars
    d. make comfortable chairs

## POSTTEST

21. Isometric
22. Paralell
23. Orthographic
24. Three-dimensional
25. Vertikal
26. Perpendiculer
27. "T" square
28. Drafting bord
29. Horizontel
30. Diminsion

## INSTRUCTOR'S SECTION

### SPELLING TEST

# TEST ANSWERS

1. C
2. C
3. B
4. B
5. B

6. D
7. A
8. A
9. D
10. A

11. C
12. C
13. B
14. B
15. B

16. D
17. A
18. A
19. D
20. A

21. A
22. B
23. A
24. A
25. B

26. B
27. A
28. B
29. B
30. B

# INSTRUCTOR'S SECTION

## PRETEST ANSWERS

## POSTTEST ANSWERS

## EVALUATION SUMMARY

### 10 POINTS EACH:

Pretest _____

Career Search _____

### 20 POINTS EACH

Objective 1: Locate points on graph paper using the Cartesian Coordinate system and draw lines between those points. _____

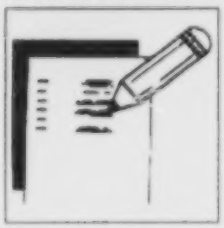
Objective 2: Make and dimension orthographic drawings using ANSI line standards. _____

Objective 3: Read a rule, measure distances using your ruler, and use your drafting board and drafting tools to draw lines. _____

Objective 4: Use your drafting board, "T" square, and triangle to make and dimension isometric drawings using ANSI line standards. _____

## INSTRUCTOR'S SECTION

1. PROCESS EVALUATION



1. PROCESS EVALUATION SCORE _____

## EVALUATION SUMMARY

The instructor is encouraged to individualize the TLA to address the specific needs of each student, considering age and ability level. In addition to the specific areas on the chart below, the instructor should take into account the student's desire, enthusiasm, etc.

**Evaluation based upon observed performance = 40 possible points.**

### EVALUATION RATING TABLE

Student Name: _____

| Criteria | Points Possible | Points Earned |
|---|---|---|
| Neatness | 20 | _____ |
| Accuracy | 10 | _____ |
| Line weight | 10 | _____ |

— continued —

## INSTRUCTOR'S SECTION

2. PRODUCT EVALUATION

## EVALUATION SUMMARY

Use the conversion table below to convert Product Evaluation scores to percentiles.

40 = 100%
39 = 97.5
38 = 95
37 = 92.5
36 = 90

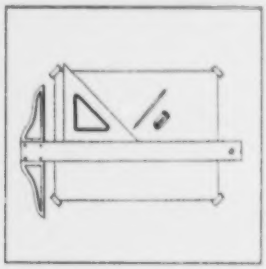
35 = 87.5
34 = 85
33 = 82.5
32 = 80

31 = 77.5
30 = 75
29 = 72.5
28 = 70

27 = 67.5
26 = 65
25 = 62.5
24 = 60

## INSTRUCTOR'S SECTION

2. PRODUCT EVALUATION



CONVERSION TABLE

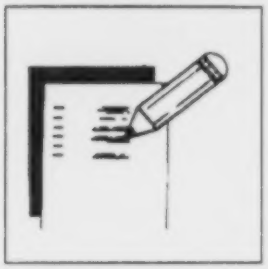
2. PRODUCT EVALUATION SCORE_____

## EVALUATION SUMMARY

Posttest score = _____

## INSTRUCTOR'S SECTION

3. WRITTEN EVALUATION



3. WRITTEN EVALUATION SCORE _____

### EVALUATION WORKSHEET

1. Process evaluation score = _____
2. Product evaluation score = _____
3. Written evaluation score = _____
4. Total score = _____

Divide Total Score by 3 to find TLA score.

Total Score for TLA =

1 + 2 + 3 = Total Score

Total Score /3 = TLA SCORE

TLA SCORE _____

## BIBLIOGRAPHY

French, Thomas E., Carl L. Svenson, Jay D. Helsel, Byron Urbanick. *Mechanical Drawing*. Gregg Division, McGraw-Hill Publishing Company. New York, NY. 1990.

Parke, Nelson L. *Lines and Views*. Nelson L. Parke. Springfield, MO, 1984.

Walker, John R. *Exploring Drafting*. The Goodheart-Willcox Company, Inc. South Holland, IL, 1987.

Wallach, Paul. *Drafting*. Glencoe Publishing Company, Inc. Encino, CA, 1981.

## INSTRUCTOR'S SECTION

# TECHNOLOGY EDUCATION

## TECHNOLOGY

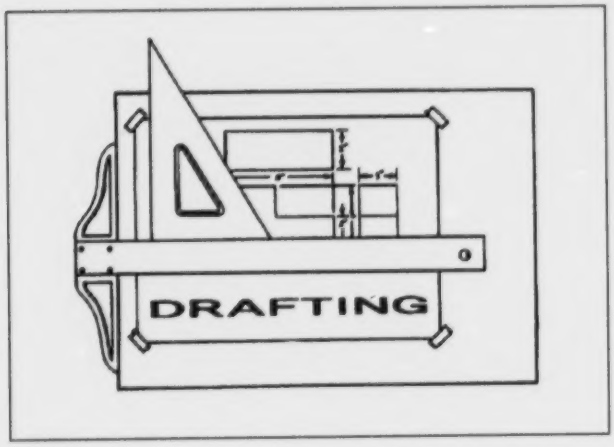
## LEARNING

## ACTIVITY

**TE3134**

# DRAFTING

**Suggested Time: 8 Days**

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# TECHNOLOGY EDUCATION DRAFTING

## DAY 1 ACTIVITIES

On Day 1 you should complete the following activities:

1. Complete Pretest
2. Read Assignments to Turn In (items to complete in 8 days)
3. Read Goal
4. Read Words You Should Know
5. Read Expected Learner Outcomes
6. Read Objectives
7. Read Related TSA Competitive Events
8. Read Academic and Workplace Applications

## SUMMARY OF ACTIVITIES

Reading Comprehension Skills:
- Gain factual information
- Make generalizations

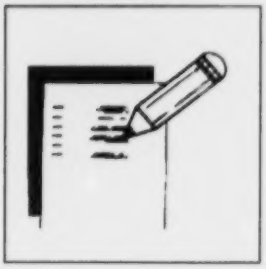
Functional Reading Skills:
- Follow written instructions
- Interpret graphics and symbols

# TECHNOLOGY EDUCATION DRAFTING

## DAY 1 ACTIVITIES

## PRETEST

### INSTRUCTIONS



You will need a computer scan sheet or card to record your answers to the following Pretest. Be sure to write your name, the title of the TLA, the date, and the class period on the computer scan sheet or card using a #2 pencil. Use rows 1-10 to record the answers to the Pretest. If your answers will be hand-scored, use a blank sheet of paper to record your answers and number your answers 1-10.

Get the Pretest Questions from your instructor.

When you finish the Pretest, return the test form and the computer scan card or notebook paper to your instructor.

# TECHNOLOGY EDUCATION DRAFTING

## DAY 1 ACTIVITIES

At the end of 8 days, you will have given the following items to your instructor for evaluation:

1. **Computer score card/sheet, with answers to:**
   a) Pretest
   b) Posttest

2. **Drawings**
   a) Cartesian Coordinate System problems 1, 2, 3, 5, 7, 8, and 10
   b) Orthographic problems 24-28, 30, 32, 36, and 40
   c) Ruler measurements from problems 58-61
   d) Isometric problems 62-65 and 67

3. **Career Search Activity**
   a) Two occupations identified
   b) Explanations of why those occupations appealed to you

## ASSIGNMENTS TO TURN IN

# TECHNOLOGY EDUCATION DRAFTING

## DAY 1 ACTIVITIES

## GOAL

After completing the Drafting TLA you will be able to use drafting tools and make two basic kinds of drawings which conform to industry standards. You will also know how much drafting affects your everyday life.

# TECHNOLOGY EDUCATION DRAFTING

## DAY 1 ACTIVITIES

## WORDS YOU SHOULD KNOW

**Dimension** — the measurement of an object in one direction.

**Drafting** — drawing a picture with a certain style, so everyone will know exactly what you mean.

**Horizontal** — lined up from left to right, with both ends at the same level.

**Isometric** — a type of drawing showing three sides of an object at once, with the sides connected as in real life (3-D).

**Line weight** — the thickness of the lines used in drafting. Heavy lines (thick lines) show the outer edges of objects. Light lines (thin lines) are used to show lines you cannot see (like lines showing the length of an object).

**Orthographic** — a type of drawing showing three sides of an object, each unconnected to the others. (Like drawing the east side of your house, then the north, then the top, all on one page).

**Parallel** — always the same distance apart, so the objects will never meet.

— continued —

# TECHNOLOGY EDUCATION DRAFTING

## DAY 1 ACTIVITIES

### WORDS YOU SHOULD KNOW

**Perpendicular** — meeting at a right (90°) angle.

**Standard** — a style for doing something so everyone can do it the same. Inches and centimeters are two different standards for measuring.

**"T" square** — a tool for drawing straight and parallel lines.

**Three-dimensional** — showing objects as having height, width, and depth (also called 3-D).

**Three-view block** — a group of three drawings, each showing a different side of an object (an orthographic drawing).

**Vertical** — lined up from top to bottom, with the top directly above the bottom.

# TECHNOLOGY EDUCATION DRAFTING

DAY 1 ACTIVITIES

## EXPECTED LEARNER OUTCOMES

- You will know and appreciate the importance of technology and technological literacy.
- You will explore career opportunities so you can make meaningful career choices.
- You will explore future educational opportunities so you can make meaningful educational choices.
- You will apply problem-solving and critical thinking techniques.
- You will apply math, science, reading, and other school subjects in a practical situation.
- You will develop basic skills in the safe and proper use of tools, machines, materials, processes, and technical concepts.
- You will recognize and develop individual talents.
- You will think logically and sequentially.
- You will develop leadership, creative abilities, positive self-concepts, and individual potential in a technological society.

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# TECHNOLOGY EDUCATION DRAFTING

## DAY 1 ACTIVITIES

## EXPECTED LEARNER OUTCOMES

- You will become a more sophisticated consumer of the goods and services of a technological society.
- You will develop an understanding of and the ability to adapt to those technological forces that influence life in the 21st Century.
- You will communicate by making clear and relevant points through the development of mental process skills.
- You will apply design, imagination and creative abilities.
- You will learn applications of lifelong learning skills.
- You will think globally and act locally.

# TECHNOLOGY EDUCATION DRAFTING

## DAY 1 ACTIVITIES

## OBJECTIVES

At the completion of this Technology Learning Activity you should be able to:

1. Set up your drafting equipment and use it to locate points on graph paper and draw lines between those points.

2. Make and dimension orthographic drawings using ANSI line standards.

3. Read a rule and measure distances using your rule.

4. Use your drafting board, "T" square, and triangle to make and dimension isometric drawings using ANSI line standards.

# TECHNOLOGY EDUCATION DRAFTING

## DAY 1 ACTIVITIES

### Related TSA Competitive Events

The following TSA Competitive Events apply to your study of drafting:

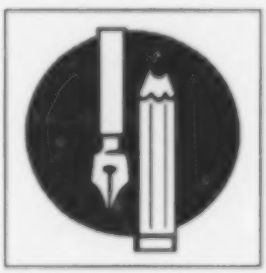
- Technology Process Display
- Technical Report Writing
- Engineering Graphic Analysis I and II

See *TSA Curricular Resources Guide* for specific details on the competitions.

# TECHNOLOGY EDUCATION DRAFTING

## DAY 1 ACTIVITIES

## ACADEMIC AND WORKPLACE APPLICATIONS



The symbols in the right column are used to identify the Academic and Workplace Applications that are reinforced by specific activities in this TLA.

**Reading Skills Applied:**

Reading Comprehension Skills:

- Gain factual information
- Make generalizations
- Distinguish fact, opinion, and inference

Functional Reading Skills:

- Follow written instructions
- Interpret graphics and symbols
- Use content area vocabulary

**Writing Skills Applied:**

Language Skills:

- Use standard grammar, spelling, punctuation, capitalization

Composition Skills:

- Use complete sentences
- Use topic sentences

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# TECHNOLOGY EDUCATION DRAFTING

## DAY 1 ACTIVITIES

## ACADEMIC AND WORKPLACE APPLICATIONS

**Mathematics Concepts Applied:**

Math Application Skills:

- Measuring and estimating
- Collecting and displaying data

If you complete Day 1 Activities with time left over, you may begin Day 2 Activities.

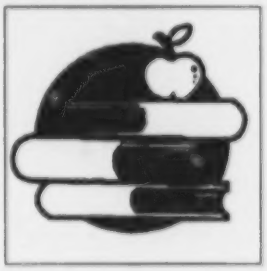
# TECHNOLOGY EDUCATION DRAFTING

## DAYS 2-3 ACTIVITIES

On Days 2 and 3 you should complete the following activities:

1. Read Information Sheet
2. Complete Objective 1

## SUMMARY OF ACTIVITIES



Reading Comprehension Skills:

- Gain factual information
- Distinguish fact, opinion, and inference

Functional Reading Skills:

- Follow written instructions
- Interpret graphics and symbols
- Use content area vocabulary

# TECHNOLOGY EDUCATION
# DRAFTING

## DAYS 2-3 ACTIVITIES

## INFORMATION SHEET

"Drafting" is the name for the special style of drawing which allows inventors and builders to communicate. A "draftsperson" is the person who makes this kind of drawing.

When scientists or inventors come up with an idea for a new product, they must find a way to change the idea into the actual product. To do this, they must be able to tell people how to build the new object.

Since the inventors can't always be present when their new products are built, especially in a large factory, they have to give the workers copies of the instructions about how to make everything, and how to put the parts together.

The inventors cannot just write out what to do, because describing all of the different parts is very hard and can be very confusing. Also, some people might not understand exactly what the inventors mean when they use certain words or phrases.

— continued —

# TECHNOLOGY EDUCATION DRAFTING

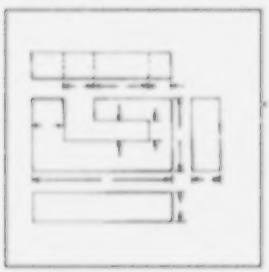
## DAYS 2-3 ACTIVITIES

## INFORMATION SHEET

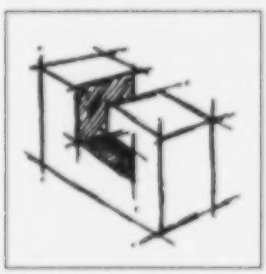
To prevent confusion, the inventors need to use technical drawings to instruct people about the way the product is put together.

Usually, the inventor gives the sketches and a model of the invention to the draftsperson.

Then the draftsperson makes exact drawings, showing the size, shape and all other important information.



Finally, the drawings are given to people in the factory, who then make the product according to the information in the drawing.



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# TECHNOLOGY EDUCATION DRAFTING

## DAYS 2-3 ACTIVITIES

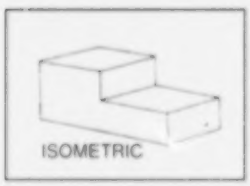
## INFORMATION SHEET

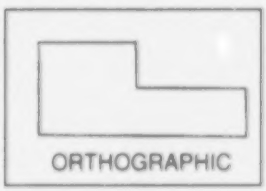
It is very important that the drawings are exactly right, because just a tiny error could keep the new invention from working.

## STANDARDS

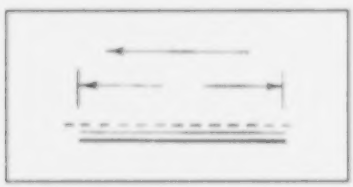
Certain standards have been developed to help draftspeople make their drawings as easily and accurately as possible. These standards include:

- the view of the object—either isometric or orthographic




- the way arrows are drawn
- the way dimensions are shown
- the lines—thin or thick, dashed or solid



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# TECHNOLOGY EDUCATION DRAFTING

## DAYS 2-3 ACTIVITIES

## INFORMATION SHEET

Draftspeople use special tools to make their drawings. The tools make their jobs much easier. You will use some of these tools in your projects over the next few days.

- *Lines and Views* book
- No.2 pencil
- Ball point pen (any color)
- Dusting brush
- Drafting board (about 12" x 17")
- Ruler (marked in 1/16-inch)
- "T" square (12" or larger)
- Triangle (30°/60°)
- Erasers
- Graph paper (8.5" x 11" with ¼-inch grid)
- Plain white paper
- Drafting tape
- Transparent tape (½-inch wide)

**Continue Days 2-3 Activities by completing Objective 1.**

# TECHNOLOGY EDUCATION DRAFTING

## DAYS 2-3 ACTIVITIES

## Locate points on graph paper using the Cartesian Coordinate System and draw lines between those points.

## OBJECTIVE 1

## INTRODUCTION

In this activity you will learn how to set up your drafting equipment. You will also practice locating points on graph paper using the Cartesian Coordinate System and joining those points by drawing straight lines from one point to the next.

To show how the Cartesian Coordinate System works, let's assume we have two points on a graph called "A" and "B". If we know where A is on the graph, we can show where B is by saying how far up, down, to the left, or to the right B is from A. To help us locate B we first break the lines on a graph into two groups: horizontal lines (or "x" lines) and vertical lines (or "y" lines). To show whether B is to the left or right of A on the x-line and up or down from A on the y-line, we use "+" and "-" signs. The "+" sign shows B is up from or to the right of A; the "-" sign shows B is down from or to the left of A. By using "x" and "y" with "+" and "-" we get the following information:

- "x+" means B is to the right of A;
- "x-" means B is to the left of A;
- "y+" means B is up from A;
- "y-" means B is down from A.

# TECHNOLOGY EDUCATION DRAFTING

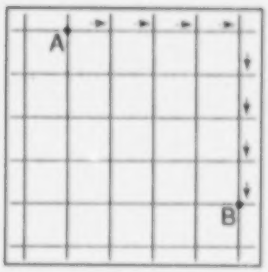
## DAYS 2-3 ACTIVITIES

So, if we know B is 1 inch to the right of A and 1 inch down from A, we can show this by writing

x+1 inch  y-1 inch

and marking B on the graph as shown to the right. (Remember that the lines on your graph paper are ¼-inch apart, so to move 1 inch in any direction will be shown by moving over 4 lines on graph paper.)

## INTRODUCTION




## TOOLS AND MATERIALS

- *Lines and Views* book
- No.2 pencil
- Eraser
- Graph paper (8.5" x 11" with ¼-inch grid); 1 sheet
- Ruler

# TECHNOLOGY EDUCATION
## *DRAFTING*

## DAYS 2-3 ACTIVITIES

### PROCEDURE

FOLLOW THESE STEPS:

STEP 1: Print your name, the name of this TLA, and the date at the bottom of your paper.

STEP 2: Turn to page 2 in your *Lines and Views* book.

STEP 3: Read the information under "MEASUREMENTS" on page 2.

STEP 4: Follow the instructions in *Lines and Views* to complete the following problems: **1, 2, 3, 5, 7, 8, and 10** (pages 2-3). Do NOT draw points 8-14 in problem 10.

**Working Tip**

*Use your ruler to draw the lines in the problems listed above.*

STEP 5: Ask your instructor to check your work and to make suggestions.

STEP 6: When you finish, clean work area and return tools and materials to their proper storage area.

**If you finish Days 2-3 Activities with time left over, begin Days 4-5 Activities.**

# TECHNOLOGY EDUCATION DRAFTING

## DAYS 4-5 ACTIVITIES

On Days 4 and 5 you should complete the following activities:

1. Read Information Sheet
2. Complete Objective 2

## SUMMARY OF ACTIVITIES

Functional Reading Skills:

- Follow written instructions
- Interpret graphics and symbols
- Use content area vocabulary

# TECHNOLOGY EDUCATION DRAFTING

DAYS 4-5
ACTIVITIES

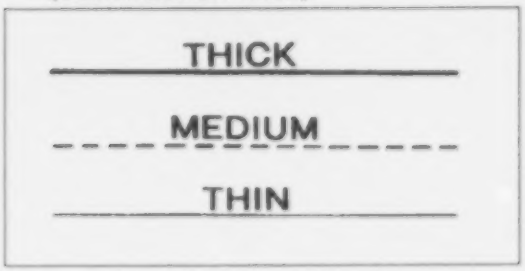
## INFORMATION SHEET

### ANSI Line Standards

ANSI (American National Standards Institute) Standards are one of the standards used in drafting, to make sure that the meaning of different lines in a drawing is clear to everyone who looks at it.

You can make your drawings according to these standards with the help of your drafting tools. The main types of lines you will be making and their purposes are:

- Thick, solid—for the edges of an object you can see (object lines).
- Medium, dashed—for the edges of an object you cannot see (hidden lines).
- Thin, solid—for an imaginary line through the center of an object, and for lines showing the dimensions of an object (construction lines).

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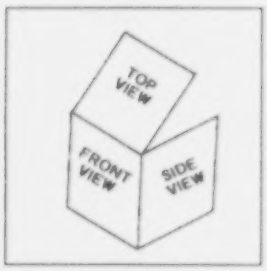
# TECHNOLOGY EDUCATION DRAFTING

## DAYS 4-5 ACTIVITIES

## INFORMATION SHEET

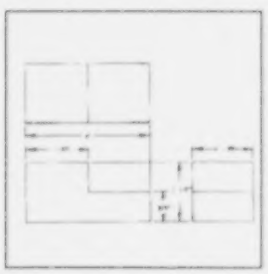
Today you will make orthographic drawings. Orthographic drawings are used by builders and craftspeople to help them build objects. These drawings give builders useful information which is different than the isometric drawings you have been doing.

Orthographic drawings show three separate views of an object on one sheet of paper—the front, side and top. This is why they are also called "three-view drawings." They look as though the figure was unfolded, like in this drawing.




Three-view drawings make it harder to understand how the parts fit together, but easier to see how the parts actually look.

There is a standard style for orthographic drawings which you will have to follow. The front view is drawn first in the lower left corner of the paper. Then the top view is drawn directly above the first. Finally, the right side view is drawn directly to the right of the front view.



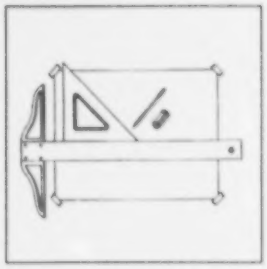
# TECHNOLOGY EDUCATION DRAFTING

## DAYS 4-5 ACTIVITIES

## OBJECTIVE 2

Make and dimension orthographic drawings using ANSI line standards.

## TOOLS AND MATERIALS



- *Lines and Views* book
- No.2 pencil
- Eraser
- Graph paper (8.5" x 11" with ¼-inch grid); 5 sheets
- Ruler

# TECHNOLOGY EDUCATION DRAFTING

## DAYS 4-5 ACTIVITIES

## PROCEDURE

FOLLOW THESE STEPS:

STEP 1: Turn to page 4 in your *Lines and Views* book and read the information under "ORTHOGRAPHIC PROJECTION" on pages 4-5.

STEP 2: Follow the instructions in *Lines and Views* necessary to complete the following problems: **24-28, 30, 32, 36, and 40** (pages 6-9). Use both sides of your graph paper and remember to print your name, the name of this TLA, the problem number, and the date on each sheet of graph paper you use.

**Working Tip**

*Where the instructions in* Lines and Views *ask you to use a 6H pencil on construction lines, you may use your No.2 pencil if you press down lightly so the line you create is thin. Apply more pressure on the pencil for hidden lines and object lines. By following these suggestions, your object lines and hidden lines will appear thicker and darker than your construction lines.*

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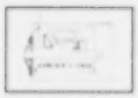
# TECHNOLOGY EDUCATION DRAFTING

## DAYS 4-5 ACTIVITIES



FOLLOW THESE STEPS:

STEP 3: Ask your instructor to come examine your work and make suggestions.

STEP 4: When you finish, clean work area and return tools and materials to their proper storage area.

**If you finish Days 4-5 Activities with time left over, you may begin Day 6 Activities.**

# TECHNOLOGY EDUCATION DRAFTING

On Day 6 you should complete the following activity:

❶ Complete Objective 3

## DAY 6 ACTIVITIES

## SUMMARY OF ACTIVITIES

Functional Reading Skills:

- Follow written instructions
- Interpret graphics and symbols
- Use content area vocabulary

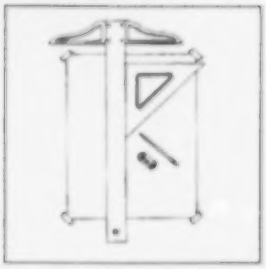
# TECHNOLOGY EDUCATION DRAFTING

## DAY 6 ACTIVITIES

## OBJECTIVE 3

**Read a rule, measure distances using your ruler, and use your drafting board and drafting tools to draw lines.**

## TOOLS AND MATERIALS



- *Lines and Views* book
- No.2 pencil
- Eraser
- Notebook paper (2 sheets)
- Ruler
- "T" square
- Drafting board
- Triangle (30°/60°)
- Graph paper (2 sheets)
- Dusting brush (optional)
- Drafting tape

# TECHNOLOGY EDUCATION DRAFTING

## DAY 6 ACTIVITIES

FOLLOW THESE STEPS:

STEP 1: Turn to page 11 in your *Lines and Views* book and read the information under "READING A RULE."

STEP 2: Follow the instructions in *Lines and Views* necessary to complete problems 58-61. Write the answers to each problem on your notebook paper. Use both sides of your notebook paper and remember to print your name, the name of this TLA, the problem number, and the date on each sheet of paper.

**IMPORTANT**

*Problem 58 should have 10 answers, beginning with "A-B" and ending with "A-K."*

*Problem 59 should have 14 answers, beginning with "A" and ending with "N."*

*Problem 60 should have 16 answers, beginning with "A" and ending with "P."*

*Problem 61 should have 14 answers, beginning with "A" and ending with "N."*

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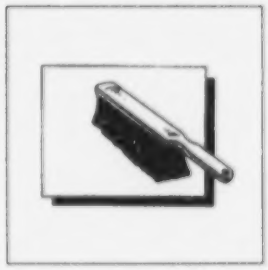
# TECHNOLOGY EDUCATION DRAFTING

## DAY 6 ACTIVITIES

FOLLOW THESE STEPS:

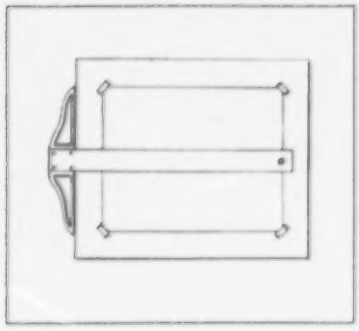
STEP 3: Use the dusting brush to dust off the drafting board, making sure that no dirt or dust particles remain. If you do not have a dusting brush, use a paper towel to wipe your drafting board clean.



STEP 4: When you finish problem 61, turn to page 12 in your *Lines and Views* book and complete problem 62 (page 12) under "USE OF DRAFTING BOARD, "T" SQUARE AND TRIANGLE." **Read the Working tips below and on the next page.**

**Working Tip #1**

*If you draw with your **right hand**, hold the "T" square with the head firmly against the left edge of the drafting board and the blade lying across the board. If you draw with your **left hand**, hold the "T" square with the head firmly against the right edge of the drafting board and the blade lying across the board. The figure to the right shows the "T" square in the correct position for right-handed drawing.*



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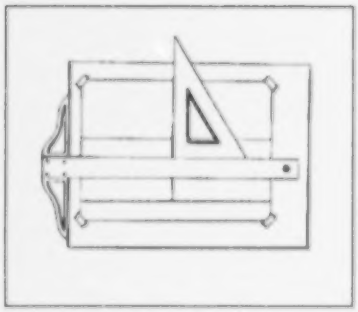
# TECHNOLOGY EDUCATION DRAFTING

## DAY 6 ACTIVITIES

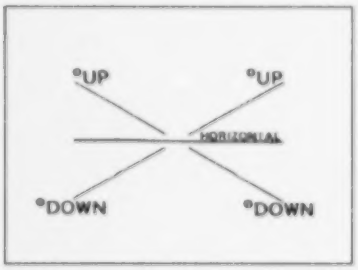
FOLLOW THESE STEPS:

**Working Tip #2**

*Use the "T" square and triangle to draw the vertical and angled lines. To use the triangle, turn the triangle so one side is against the edge of the "T" square and press the triangle and "T" square firmly against the drafting board. The figure to the right shows the correct position of the triangle and "T" square to draw the top half of the vertical divider line in problem 62.*



*To draw lines at 30° angles to the horizontal, turn the triangle so the long side is against the "T" square and draw a line down the slope of the triangle to the point where the triangle and "T" square meet. Depending on how you place your triangle, you will produce one of the lines in the figure to the right.*




STEP 5: Ask your instructor to come examine your work and make suggestions.

STEP 6: When you finish, clean work area and return tools and materials to their proper storage area.

**If you complete Day 6 Activities with time left over, you may begin Day 7 Activities.**

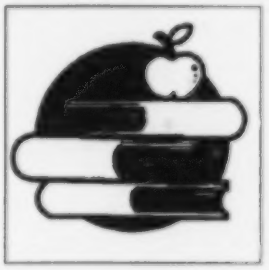
# TECHNOLOGY EDUCATION DRAFTING

## DAY 7 ACTIVITIES

On Day 7 you should complete the following activity:

1. Complete Objective 4

## SUMMARY OF ACTIVITIES



Functional Reading Skills:

- Follow written instructions
- Interpret graphics and symbols
- Use content area vocabulary

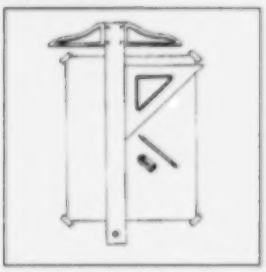
# TECHNOLOGY EDUCATION DRAFTING

## DAY 7 ACTIVITIES

## OBJECTIVE 4

**Use your drafting board, "T" square, and triangle to make and dimension isometric drawings using ANSI line standards.**

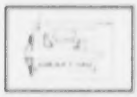
## TOOLS AND MATERIALS



- *Lines and Views*
- No.2 pencil
- Dusting brush (optional)
- Eraser
- "T" square
- Triangle (30°/60°)
- Drafting board
- Graph paper (8.5" x 11" with ¼-inch grid)
- Plain white paper (8.5" x 11")
- Drafting tape
- Ruler

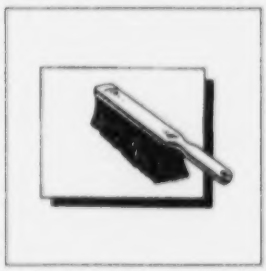
# TECHNOLOGY EDUCATION DRAFTING

## DAY 7 ACTIVITIES



FOLLOW THESE STEPS:

## PROCEDURE



STEP 1: Use the dusting brush to dust off the drafting board, making sure that no dust or dirt particles remain. If you do not have a dusting brush, use a paper towel to wipe your drafting board clean.

STEP 2: Read the information under "ISOMETRIC DRAWINGS" and follow the instructions in *Lines and Views* necessary to complete problems **63, 64, and 65** (page 13). Remember to use separate sheets of paper for each problem and print your name, the name of this TLA, the problem number, and the date on each sheet.

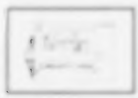
STEP 3: Ask your instructor to come examine your work and make suggestions.

STEP 4: When you finish, clean work area and return tools and materials to their proper storage area.

**If you complete Day 7 Activities with time left over, you may begin Day 8 Activities.**

# TECHNOLOGY EDUCATION DRAFTING

## DAY 8 ACTIVITIES



On Day 8 you should complete the following activities:

1. Read Impact Statements.
2. Complete Career Search Activity.
3. Complete any unfinished assignments.
4. Complete Posttest

## SUMMARY OF ACTIVITIES

Reading Comprehension Skills:

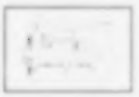
- Gain factual information
- Make generalizations

Functional Reading Skills:

- Follow written instructions
- Interpret graphics and symbols

# TECHNOLOGY EDUCATION
# DRAFTING

## DAY 8
## ACTIVITIES



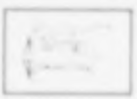
## ENVIRONMENTAL IMPACT

Drafting is used in most industries and factories, and scientists are constantly trying to improve the way factories work. Draftspeople help produce products to clean the smoke from industrial chimneys and to clean up other forms of pollution. Also, drafting is part of the process of making new products which are good for the environment, such as fuel-efficient cars and non-polluting transportation.

Drafting has yet another use which affects the environment: Draftspeople help make maps showing which areas are polluted and what kind of pollution is there so the areas can be cleaned up.

# TECHNOLOGY EDUCATION DRAFTING

## DAY 8 ACTIVITIES



## SOCIAL/CULTURAL IMPACT

Drafting is used to draw site plans, showing which buildings will be built, what they will look like, and exactly how big they will be. This is necessary to make sure that the buildings are legally designed and do not affect other people's property. The draftspeople must do their jobs very well to avoid causing problems for the property owners.

Additionally, products such as telephones, new cars and airplanes, all built with the help of drafting, help tie all of the people in the world closer together. It is as easy to call someone in Germany as your next door neighbor, and this ease is partially due to the influence of drafting.

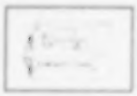
## ECONOMIC IMPACT

Drafting is needed to show workers exactly what new products look like, so the products can be made on an assembly line. With drafting, large numbers of products can be built at low cost, which makes them more affordable for consumers.

Advances in drafting techniques, in addition to Computer-Aided Design and Computer-Aided Manufacturing, help move new products from the drafting board into the stores much faster than ever before. This gives consumers more choices of products than was previously possible. Additionally, the cost of production to make new products is reduced.

# TECHNOLOGY EDUCATION DRAFTING

## DAY 8 ACTIVITIES



## POLITICAL IMPACT

Drafting is used to make maps and to show exactly where the borders of countries are. It is very important to show, for example, if a country's border includes a certain area or not. Very accurate mapping can help prevent disputes between states or countries.

## ERGONOMIC IMPACT

Ergonomics means developing products and systems that are comfortable for people to use and that fit their needs. Drafting has an ergonomic effect, because ergonomic engineers use drafting to design products people like or which are easy to use. This includes changing where car instruments are on the dashboard and designing seats. A mouse for a computer is another example of an ergonomic product.

# TECHNOLOGY EDUCATION DRAFTING

## DAY 8 ACTIVITIES

## CAREER SEARCH ACTIVITY
### INSTRUCTIONS

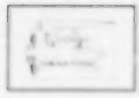
Using *Career Search Abstracts*, find the occupations listed below. Select the two occupations that sound most appealing to you. On a separate sheet of notebook paper, list the two occupations you selected and tell why. Remember to write using complete sentences, proper grammar, and correct spelling. Give the completed sheets to your instructor.

### RELATED CAREERS

- Commercial Artist
- Designer
- Drafter
- Engineering Technician

# DRAFTING: CAREER SEARCH ABSTRACTS

## DAY 8 ACTIVITIES



## COMMERCIAL ARTIST

### Nature of the Occupation

Commercial or graphic artists apply their skills and artistic vision to a variety of media to produce art that serves a client's needs. They plan, design and draw illustrations for various media including billboards, brochures, catalogs, books, magazines, newspapers, television and packaging.

Duties may include but are not limited to the following:

- Conferring with clients to plan design and determine budget, presentation approaches, and styles
- Examining designs, sketches, or illustrations
- Determining nature, size, and arrangement of materials
- Producing samples for client approval
- Directing and instructing photographers or illustrators in execution of design concepts
- Presenting production to clients for approval

### Occupation Specialties

**Art Directors** (141.031-010) formulate concepts and supervise workers engaged in executing layout designs for artwork and copy to be presented by such visual communication media as magazines, books, newspapers, television, posters, and packaging.

**Cartoonists** (141.061-010) draw comic or editorial cartoon and comic strips to amuse readers and illustrate or comment upon political events, advertising, stories, or articles.

**Graphic Designers** (141.061-018) design art and copy layouts for material to be presented by such visual communication media as books, magazines, newspapers, television, packaging, and advertising.

**Illustrators** (141.061-022) draw or paint illustrations for use by various media to explain or adorn the printed or spoken word.

**Medical and Scientific Illustrators** (141.061-026) make sketches and construct 3-dimensional models to illustrate surgical and medical research procedures, anatomical and pathological specimens, clinical disorders, micro-organisms, and plant and animal tissue.

### Working Conditions

Commercial artists may work alone or as part of a team headed by the art director. Many illustrators are free-lance artists who service regular accounts along with new or one-time customers.

Working conditions vary according to the type of artwork and the employer. Generally, commercial artists work in clean, well-lighted, temperature-controlled studios in office buildings, department stores, galleries, advertising agencies, and printing or industrial plants. Medical and scientific illustrators frequently spend time in operating rooms observing and sketching surgical procedures or in laboratories containing specimens and equipment that they use to prepare drawings. Commercial artists may spend much of their time standing or sitting at a drawing board or work table.

Salaried commercial artists usually work 35 to 40 hours a week. Employers generally provide all supplies and equipment. Many jobs in this field lead to free-lance work and more flexible hours.

### Worker Requirements

You should like:

- Activities concerned with communicating ideas to people
- Activities which require creative imagination
- Activities bringing satisfaction from seeing your work in print

You should be able to:

- Reason logically and create new ideas
- Understand the meaning of words and use language effectively
- Make decisions based on personal judgment
- Interpret feelings, ideas, or facts artistically
- Accept criticism of your work
- Influence people's opinions, attitudes, or judgments
- Understand the 2-dimensional representation of objects
- Perceive details in objects or drawings and see differences in their shapes or shadings
- Move your fingers and handle

**OCCUPATION SPECIALTIES**

DOT CODES

141.031-010 Art Director
141.061-010 Cartoonist
141.061-018 Graphic Designer
141.061-022 Illustrator
141.061-026 Medical And Scientific Illustrator

SOC CODE: 322, 325 OES CODE: 34035

OKLAHOMA CAREER SEARCH



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# DRAFTING: CAREER SEARCH ABSTRACTS

## DAY 8 ACTIVITIES

## COMMERCIAL ARTIST

small objects accurately

Physically you must:
- Use your hands and fingers fully
- Coordinate the movements of eyes and hands or fingers
- See well, naturally or with correction, and distinguish colors
- Talk and hear, if an art director or a graphic designer

Special Requirements:
Most employers prefer 4-year art school graduates with technical and commercial skills. Graphic arts applicants should demonstrate talent, training, and experience. Artists in scientific and medical illustration need specialized training. The devise used by almost all in the graphic arts field to gain employment is the portfolio, a collection of handmade, computer-generated or printed examples of the artist's best work.

Opportunities for Experience:
Related post secondary programs may offer experience. Working on school yearbooks, newspapers, stage sets, bulletin boards, or posters are good opportunities for experience. Additionally, creating layouts, illustrations or posters for church and community groups offer more experience.

### Earnings and Advancement

Commercial artists' earnings depend on skill, education, type of artwork, geographic area, and type and size of employer. Earnings of a free-lance commercial artist may vary with the artist's individual fees and reputation, as well as the nature and amount of artwork sold.

Earnings:
Nationally, commercial artists who work full time earned an annual salary of $22,684 per year in 1992. The middle 50 percent earned from $16,650 to $31,376. Starting salaries of design/graphic arts majors averaged $21,624 in 1992.

Career Ladder for this Occupation may look like this:
- Art Director
- Illustrator
- Trainee

Beginning commercial artists usually need on-the-job training and are assigned routine work. Advancement depends on individual talent, creativity, and education. Experienced commercial artists may open their own studios or eventually become art directors, if they have managerial ability.

### Employment and Outlook

Nationally, there were approximately 230,000 fine artists and commercial artists employed in 1990, with free-lancers making up 3 out of 5 of those jobs. Employment is expected to grow faster than the average for all occupations through the year 2000 as the areas of advertising and design continue to expand with the economy. Commercial artists with average ability and no specialized training are expected to encounter keen competition for beginning jobs and have limited advancement opportunities, since there are still more visual artists than are in demand.

**Oklahoma Employment and Outlook**

In Oklahoma, 85 job openings for commercial artists are projected annually until the year 2000. Most of these job openings represent vacancies created by those leaving the occupation, promotions, retirements, etc. rather than new job growth. In 1990, commercial artists held 3,716 jobs in Oklahoma. They are expected to hold 3,853 jobs by the year 2000. This is considered a slow growth rate due to the relatively large number of commercial artists employed in Oklahoma in 1990.

### Related Education and Training

Level(s) of education and training usually needed for this occupation:
- On-the-job training
- Technical, junior or community college
- College bachelor's degree

School subjects helpful in preparing for this occupation include:
- College Preparatory
- Arts
- Crafts
- Custodial Service
- Photography
- Graphic Arts

### More Sources of Information

- The Graphic Artists Guild
  11 West 20th Street - 9th Floor
  New York, NY 10011-3704
- National Association of Schools of Art and Design
  11250 Roger Bacon Drive
  Suite 21
  Reston, VA 22090
- National Art Education Association
  1916 Association Drive
  Reston, VA 22091-1590
- American Institute of Graphic Artists
  1059 3rd Avenue
  New York, NY 10021
- The Society of Illustrators
  128 East 63rd Street
  New York, NY 10021
- Association of Medical Illustrators
  1819 Peachtree St., NE
  Suite 560
  Atlanta, GA 30309



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# DRAFTING:
# CAREER SEARCH ABSTRACTS

## DAY 8
## ACTIVITIES

## DESIGNER

### Nature of the Occupation

Designers arrange and design articles, products and materials in such a way that they not only serve the purpose for which they were intended but are visually pleasing as well. Designers usually specialize in one particular area of design, such as automobiles, clothing, furniture, home appliances, movie and theater sets or floral arrangements.

Duties may include but are not limited to the following:

- Conferring with clients to determine factors which affect planning
- Formulating a plan to serve an intended purpose
- Rendering design ideas in the form of paste-ups, drawings, or illustrations and presenting them to clients
- Estimating material requirements and costs
- Selecting, designing, and purchasing furnishings and art works
- Writing specifications such as colors and types of material

### Occupation Specialties

**Interior Designers** (142.051-014) plan and furnish the interiors of homes, public buildings and commercial establishments.

**Fashion Designers** (142.061-018) design coats, suits, dresses, hats, handbags, shoes, gloves, jewelry, and underwear.

**Package Designers** (142.081-018) create product containers that are not only attractive but easy to handle and store.

**Textile Designers** (142.061-014) design fabrics for garments, upholstery, rugs, and other products.

**Floral Designers** (142.081-010) cut and arrange fresh, dried or artificial flowers and foliage to the specifications of the sender.

**Industrial Designers** (142.061-026) develop countless manufactured products such as cars, home appliances, computers, cabinets and pens.

### Working Conditions

Designers work alone but coordinate their efforts with many other people. Interior designers may work in their homes, subcontractors' offices, and establishments that sell the various materials they work with. Interior designers' hours are often long and irregular. They usually adjust their workday to suit their clients, meeting with them evenings or on weekends when necessary.

Clothes designers usually work in an area that contains all the equipment and materials needed for the creation and fashioning of clothing. They usually work regular hours, however, their work may be seasonal and require long hours before fashion showings.

Industrial designers usually work regular hours but occasionally work overtime to meet deadlines. Floral designers usually work regular hours in a pleasant work environment.

Tools, Equipment and Materials used may include:

- Blueprints
- Sketch Pads
- Drawing Instruments
- Rulers
- Fabrics
- Cutting Tables
- Plastics
- Ceramics
- Textiles
- Woods
- Dress Forms (Mannequins)

### Worker Requirements

You should like:

- Activities for artistic self expression
- Activities involving business contact with people

You should be able to:

- Demonstrate artistic talent, imagination, and creative drawing and ability
- Perceive detail
- Visualize three-dimensional objects from diagrams
- Influence others in their judgments about ideas and things
- Plan, organize and carry out projects to completion

Physically you must:

- Have good vision, depth perception and color vision

**OCCUPATION SPECIALTIES**

DOT CODE:

142.051-014 Interior Designer
142.061-018 Fashion Designer
142.061-026 Industrial Designer
142.081-018 Package Designer
142.061-014 Textile Designer
142.081-010 Floral Designer

SOC CODE: 322 OES CODE: 34041, 34038

OKLAHOMA CAREER SEARCH



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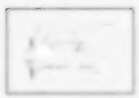
# DRAFTING: CAREER SEARCH ABSTRACTS

## DAY 8 ACTIVITIES



## DESIGNER

- Have full use of your hands and fingers

Special Requirements

Employers usually require training covering all phases of interior and clothing design. Formal training is becoming increasingly important. A good portfolio is often a key aspect in landing a job. Educational requirements vary among the design professions, but industrial design requires a bachelor's or master's degree, and interior designers generally need a bachelor's degree. It is also highly recommended that students in the design field take computer aided design courses, since most employers expect new employees to be familiar with computers.

Opportunities for Experience

Opportunities for experience and exploration in clothes designing include summer and part time work in department stores, fabric firms, or costume rental houses. Work with amateur theater wardrobes and dressmaking are also good experience for this occupation. Interior designers may serve an informal apprenticeship in a design studio. Opportunities for experience in floral design include summer and part time work in a florist shop.

### Earnings and Advancement

Designers may be paid straight salaries, salaries plus commissions or bonuses or straight commissions. Income is affected by volume of business, professional prestige, economic level of clients and business competence.

Earnings

In 1992, average annual salaries for first year designers was $21,353. Median annual earnings for experienced full-time designers were about $26,624 or $512 per week. The middle 50 percent earned between $17,200 and $38,000 a year, while the lowest 10 percent earned less than $12,150, and the highest 10 percent earned more than $51,000.

Floral designers generally earned less than this. Beginning floral designers had average earnings of approximately $10,815 per year in 1992. Designers with 1 to 3 years of experience earned $12,670, while designers with more than 3 years of experience earned about $36,360, while senior designers with an average of 9 years of experience earned about $46,350. Industrial designers in managerial or executive positions earned substantially more — up to $88,500.

Fringe Benefits

Fringe benefits for designers may include commissions, profit sharing and bonuses. For those employed by a firm, benefits may include paid holidays and vacations, health, life, and accident insurance, retirement plans, and sick leave. These benefits are usually paid for, at least in part, by the employer.

Career Ladder for this Occupation may look like this:

- Self-employed
- Design Department Head
- Designer
- Junior Designer

### Employment and Outlook

Nationally, there were approximately 339,000 designers employed in 1990, with nearly one-third of them self-employed. Employment is expected to grow faster than the average through the year 2005. In response to factors such as product quality and safety, new and high-tech products for businesses, offices, medicine and transportation, demand for industrial designers should increase. Growth in population and personal incomes should spur demand for interior, fashion, floral, and set designers. However, because many people are attracted to the field, stiff competition is expected, except in floral design.

**Oklahoma Employment and Outlook**

In Oklahoma, 33 job openings for designers are projected annually until the year 2000. These job openings represent new job growth as well as vacancies created by those leaving the occupation, promotions, retirements, etc. In 1990, designers held 1,757 jobs in Oklahoma. They are expected to hold 1,868 jobs by the year 2000.

### Related Education and Training

Level(s) of education and training usually needed for this occupation:

- On-the-job training
- Technical, junior or community college
- College bachelor's degree

Level(s) of education and training also available for this occupation:

- College master's degree

School subjects helpful in preparing for this occupation include:

- Arts • Graphic Arts
- Clothing & Textiles
- Interior Design
- Cooperative Education - Home Economics
- General Merchandising

### More Sources of Information

- American Society of Interior Designers
  1430 Broadway
  New York, NY 10018
- Industrial Designers Society of America
  1142 Walker Rd
  Great Falls, VA 22066

# DRAFTING: CAREER SEARCH ABSTRACTS

## DAY 8 ACTIVITIES

## DRAFTER

### Nature of the Occupation

Drafters prepare detailed drawings of buildings, products and machinery from sketches and specifications made by engineers, architects and designers. Many drafters now use computers to draw illustrations and do their work.

Duties may include but are not limited to the following:

- Preparing complete and accurate working plans and detailed drawings from rough or detailed sketches or notes
- Preparing final sketches and checking dimensions of parts and materials to be used
- Preparing charts of statistical data
- Drawing finished designs from sketches
- Reproducing working drawings on copy machines
- Using computer aided drafting systems to prepare drawings.

### Occupation Specialties

**Architectural Drafters** (001.261-010) produce architectural and structural working drawings of any type of building or other structure to comply with building codes.

**Electrical Drafters** (003.281-010) prepare wiring diagrams and drawings of electrical equipment for use by construction and repair workers who build, install and repair electrical equipment and wiring.

**Civil Drafters** (005.281.010) prepare detailed construction drawings, topographical profiles and related maps and specification sheets used in the planning and construction of highways, in flood control, drainage and other projects.

**Mechanical Drafters** (007.281-010) prepare detailed working drawings of machinery and mechanical devices.

**Marine Drafters** (014.281.010) make drawings of ships, docks and other marine structures and equipment.

**Commercial Drafters** (017.261-026) perform general duties in all-around drafting such as laying out building locations, planning arrangements and preparing charts, forms and records.

### Working Conditions

Drafters may work alone or as members of a drafting team.

Drafters either sit or stand at drafting tables in well-lighted rooms. They may sometimes work at construction sites or in machine shops.

Drafting work can be demanding; it requires close attention to detail, and many hours may be spent leaning over tables or sitting at computer terminals working on large drawings.

Drafters generally work a 5 day, 35 to 40 hour week. Overtime may be necessary to meet deadlines.

Drafters may join professional associations such as the American Institute for Design and Drafting. Members usually pay dues.

Tools, Equipment and Materials used may include:

- Drafting Machines
- Precision Measurement Instruments
- Calculators
- Rulers, Templates • T-Squares
- Dividers • Protractors
- Mechanical or Computerized Drafting Devices
- Engineering Tables and Manuals
- Slide Rules • Straight Edges
- Triangles • Compasses
- French Curves
- Computer-aided Drafting Systems (CAD)

**OCCUPATION SPECIALTIES**

DOT CODE

| | |
|---|---|
| 001.261-010 Drafter, Architectural | 007.281-010 Drafter, Mechanical |
| 003.281-010 Drafter, Electrical | 014.281-010 Drafter, Marine |
| 005.281-010 Drafter, Civil | 017.261-026 Drafter, Commercial |

SOC CODE: 372 OES CODE: 22514

OKLAHOMA CAREER SEARCH



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# DRAFTING: CAREER SEARCH ABSTRACTS

## DAY 8 ACTIVITIES

## DRAFTER

### Worker Requirements

You should like:
- Activities of a scientific or technical nature
- Working with things and objects
- Activities which involve machines, processes or methods

You should be able to:
- Work within precise limits or standards of accuracy
- Understand and apply technical knowledge and theoretical principles
- Perform mathematical computations accurately
- Rate information according to measurable standards
- Concentrate for long periods of time
- Work under pressure
- Draw freehand three-dimensional objects
- Do detailed work accurately and neatly

Physically you must:
- Use your arms, hands, and fingers well
- See well, either naturally or with correction

Opportunities for Experience:

Summer and part-time co-op programs may be available through high schools, vocational centers or community colleges. Experience can also be gained through a formal apprenticeship program or any branch of the military service.

Methods of Entry:

Methods of entering this occupation include directly applying to employers and taking civil service exams. Positions may also be located by consulting newspaper want ads, school and college placement offices and state employment offices.

### Earnings and Advancement

Earnings depend upon the type of company and geographic location. Earnings are higher for workers in urban areas and for those working for manufacturing companies.

Earnings:

On the national level, drafters working full-time earned an average annual salary between $19,458 and $35,510, depending on experience. Experienced drafters in manufacturing, transportation, and utilities earned salaries averaging between $19,716 and $33,390 per year. Senior drafters averaged about $38,372 a year.

Fringe Benefits:

Depending on the employer, drafters may receive paid vacations and holidays; health, accident and dental insurance; retirement plans; and sick leave.

Career Ladder for this Occupation may look like this:
- Senior Drafter or Chief Drafter
- Junior Drafter
- Trainee/Apprentice

Drafters may advance through experience and additional education.

### Employment and Outlook

There were approximately 326,000 drafters employed nationally in 1990. Employment of drafters is expected to grow more slowly than the average for all occupations through the year 2005. However, greater use of computer-aided drafting equipment will increase drafters' productivity and is therefore expected to offset some of the increase in demand for drafting services associated with industrial growth.

Drafters are highly concentrated in industries that are sensitive to cyclical swings in the economy, such as engineering, architectural services and durable goods manufacturing. During recessions, when fewer buildings are designed, drafters may be laid off.

**Oklahoma Employment and Outlook**

In Oklahoma, 139 job openings for drafters are projected annually until the year 2000. These job openings represent vacancies created by those who leave the occupation, are promoted or retire, etc. rather than new job growth. In 1990, drafters held 3,109 jobs in Oklahoma. They are expected to hold 3,396 jobs by the year 2000.

### Related Education and Training

Level(s) of education and training usually needed for this occupation:
- High school diploma with vocational education
- Technical, junior or community college
- Apprenticeship

Level(s) of education and training also available for this occupation:
- College bachelor's degree

School subjects helpful in preparing for this occupation include:
- Algebra • Geometry
- Trigonometry • Drafting
- Cooperative Education Trade & Industrial
- Graphic Arts • Computers
- Mechanical Drawing

### More Sources of Information

- American Institute of Architects 1735 New York Avenue, NW Washington, DC 20006
- National Association of Trade and Technical Schools 2251 Wisconsin Ave., NW Washington, DC 20007

# DRAFTING: CAREER SEARCH ABSTRACTS

## DAY 8 ACTIVITIES

# ENGINEERING TECHNICIAN

### Nature of the Occupation

Engineering technicians apply the principles and theories of science, engineering, and mathematics to solve problems in research and development, manufacturing, sales, and customer service.

Duties may include but are not limited to the following:

- Build or set up equipment
- Prepare experiments
- Calculate and record results
- Make prototype versions of newly designed equipment
- Assist in routine design work
- Prepare materials specifications
- Devise and run tests to ensure product quality
- Study ways to improve manufacturing efficiency
- Supervise production workers
- Serve as field representatives of manufacturers, retailers, or wholesalers
- Help customers install, operate and maintain complex technical equipment
- Write repair or operating manuals

### Occupation Specialties

**Electrical Technicians** (003.161-010) apply electrical theory and related knowledge to test and modify developmental or operational electrical machinery and electrical control equipment and circuitry in industrial or commercial plants and laboratories.

**Electronics Technicians** (003.161-014) apply electronic theory, principles of electrical circuits, electrical testing procedures, engineering mathematics, physics, and related knowledge to lay out, build, test, troubleshoot, repair, and modify developmental and production electronic equipment, such as computers, missile-control instrumentation, and machine-tool numerical controls.

**Mechanical-Engineering Technicians** (077.161-026) develop and test machinery and equipment, applying knowledge of mechanical engineering technology, under the direction of engineering and scientific staff.

**Industrial Engineering Technicians** (012.267-010) study and record time, motion, methods, and speed of maintenance, production, clerical and other work operations to establish standard production rates and improve efficiency.

**Civil Engineering Technicians** (005.061-014) help civil engineers plan and build highways, buildings, bridges, dams, wastewater treatment systems, and other structures; they also do related surveys and studies. Some inspect water and wastewater treatment systems to ensure that pollution control requirements are met. Others estimate construction costs and specify materials to be used.

### Working Conditions

Most engineering technicians work regular hours in laboratories, offices, electronics shops, or industrial plants. Service representatives usually spend much of their time working in customers' establishments. Some may be exposed to electrical shock hazards from equipment. Technicians may work in civil, electrical, industrial or mechanical as well as other fields of engineering.

Tools, Equipment and Materials used may include:

- Measuring and Diagnostic Devices
- Sketches, Diagrams, Layouts, and Drawings
- Computer Terminals
- Calculators
- Graphs
- Machine Tools
- Engineering Specifications
- Stop Watches
- Motion Picture Cameras
- Electrical Recorders

### Worker Requirements

You should like:

- Activities involving things and objects
- Tasks of a scientific and technical nature
- Activities involving processes, methods and machines

You should be able to:

- Perform duties that change frequently
- Plan and direct an entire activity

**OCCUPATION SPECIALTIES**

DOT CODE: 003.161-010 Electrical Technician
003.161-014 Electronics Technician
077.161-026 Mechanical Engineering Technician
012.267-010 Industrial Engineering Technician

SOC CODE: 371 OES CODE: 22505, 22508

OKLAHOMA CAREER SEARCH

# DRAFTING: CAREER SEARCH ABSTRACTS

## DAY 8 ACTIVITIES

## ENGINEERING TECHNICIAN

- Make decisions using personal judgment
- Make decisions using standards that can be checked or measured
- Work within precise limits or standards of accuracy
- Work well with others

Physically you must:
- Handle, reach, finger, and feel objects
- See well, naturally or with correction

Special Requirements:
Most employees prefer applicants with technical training or college courses in science, engineering and mathematics. Some positions may require additional specialized training and experience.

Opportunities for Experience:
Experience may be obtained through apprenticeship programs or through Armed Forces training and experience programs.

Methods of Entry:
Methods of entering this occupation include directly applying to employers and promotion from entry-level jobs. Assistance locating a job may also be obtained by consulting newspaper want ads.

### Earnings and Advancement

Earnings depend on the education and experience of the employee and conditions of his/her employment—private sector or the federal government. Engineering technicians advance by successful on-the-job experience and by obtaining necessary special training. They may move from routine work to more difficult assignments and some may even become supervisors or engineers.

Earnings:
Junior technicians earned around $21,000 in 1992. Engineering technicians with more experience and the ability to work with little supervision averaged $27,196 and those in supervisory or senior level positions averaged $39,964.

Engineering technicians working for the federal government started at $13,920, $15,626 or $17,482 depending on their education and experience.

Fringe Benefits:
Depending on the employer, engineering technicians may receive health and life insurance, paid holidays and vacations, and sick leave.

Career Ladder for this Occupation may look like this:
- Engineer
- Supervisor
- Experienced Engineering Technician
- Entry Level Engineering Technician

### Employment and Outlook

Nationally, engineering technicians hold about 755,000 jobs. Over two-fifths work in the manufacturing of electrical and electronic machinery and equipment, transportation equipment and industrial machinery industries. Over one-fifth work in engineering and business service industries doing engineering work for government, manufacturing or other organizations. The federal government employs about 65,000 engineering technicians; state governments employ about 37,000; and local governments about 26,000.

Well-qualified engineering technicians should experience good employment opportunities through the year 2005. Employment is expected to increase faster than average for all occupations due to expected continued rapid growth in the output of technical products. Many technician jobs are defense related; cutbacks in defense spending could result in layoffs.

### Related Education and Training

Level(s) of education and training usually needed for this occupation:
- High school diploma with vocational education
- Technical, junior or community college

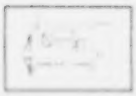
School subjects helpful in preparing for this occupation include:
- Algebra • General Math
- Geometry • Biology
- Chemistry • Earth Science
- General Science • Physics
- Physical Science
- Custodial Service

### More Sources of Information

- International Society of Certified Electronics Technicians
  2708 West Berry, Suite 3
  Fort Worth, TX 76109
- National Association of Power Engineering, Inc.
  2350 E. Devon Ave., Suite 115
  Des Plaines, IL 60018
- JETS - Guidance
  1420 King Street, Suite 405
  Alexandria, VA 22314-2715
  (Send SASE with request)
- International Union of Operating Engineers
  1125 Seventeenth Street, NW
  Washington, DC 20036
- The Professional Electronic Technicians Association
  602 North Jackson Street
  Greencastle, IN 46135

# TECHNOLOGY EDUCATION DRAFTING

## DAY 8 ACTIVITIES



## POSTTEST

### INSTRUCTIONS

You will need a computer scan sheet or card to record your answers to the following Posttest. Be sure to write your name, the title of the TLA, the date, and the class period on the computer scan sheet or card using a No.2 pencil. Use rows 11-20 to record the answers to the Posttest. If your answers will be hand-scored, use a blank sheet of notebook paper to record your answers and number your answers 11-20.

Use rows 21-30 on the test card. If the word is spelled correctly, mark (a) on the computer score sheet or card. If the word is spelled incorrectly, mark (b) on the test card. If your answers will be hand-scored, use a blank sheet of notebook paper to record your answers and number your answers 21-30.

(a) correct (b) incorrect

### SPELLING TEST INSTRUCTIONS

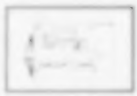
**Get Posttest Questions from your instructor.**

**When you finish the Posttest, return the test form and the computer scan card or notebook paper to your instructor.**

**If you complete Day 8 Activities with time left over, you may complete a Skunk Works Activity.**

# TECHNOLOGY EDUCATION DRAFTING

## SKUNK WORKS



## BACKGROUND

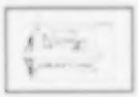
The term *Skunk Works* comes from an engineering division of the 3M Company. In the late 1960s a group of engineers at 3M wanted to design a new product, but the managers of the company would not give them the time or money for research. So they decided to design the product anyway, then try to convince the company to market it. Whenever the engineers could grab a few extra minutes from their regular assignments, they worked on the new product. In early 1969 they presented it to the marketing division of 3M and the company has been selling it ever since. The product: Velcro fasteners.

## CHALLENGE

Your *Skunk Works Challenge* is to complete problems 91, 92, and 93 in *Lines and Views*.

# TECHNOLOGY EDUCATION DRAFTING

## SKUNK WORKS



## TOOLS AND MATERIALS

- *Lines and Views* book
- No.2 pencil
- Ball point pen (any color)
- Dusting brush (optional)
- Eraser
- Drafting board
- Heavy graph paper (¼-inch grid)
- Clear tape (¼-inch wide)
- Ruler
- Scissors

# TECHNOLOGY EDUCATION DRAFTING

## SKUNK WORKS

## PROCEDURE

FOLLOW THESE STEPS:

STEP 1: Use the dusting brush to dust off the drafting board, making sure that no dirt or dust particles remain. If you do not have a dusting brush, use a paper towel to wipe your drafting board clean.

STEP 2: Turn to page 17 in *Lines and Views* and read the information under "DEVELOPMENTS."

STEP 3: Follow all instructions necessary to complete problems **91, 92, and 93** (pages 17 and 18).

STEP 4: When you finish, clean the work area and return tools and materials to their proper storage areas.

SUMMARY WORKSHEET

INSTRUCTOR'S SECTION

Equipment, Tools, and Supplies: Drafting
Summary Worksheet

| Equipment, Tools, and Supplies | Per Student | Per Period | Total Needed | Special Considerations | Cost per Student | Cost per Period | Total Cost | Special Considerations |
|---|---|---|---|---|---|---|---|---|
| #2 pencil | 1 | | | Breakage | | | | |
| Computer scan card/sheet | 1 | | | Mistakes | | | | |
| Plain white paper (8.5" x 11") | 3 | | | Mistakes | | | | |
| Dusting brush (optional) | 1 | | | | | | | |
| Eraser | 1 | | | Damage | | | | |
| "T" square | 1 | | | | | | | |
| Triangle (30°/60°) | 1 | | | | | | | |
| Drafting board | 1 | | | | | | | |
| Heavy graph paper (8.5" x 11" with ¼ inch grid) | 1 | | | Mistakes | | | | |
| Graph paper (8.5" x 11" with ¼ inch grid) | 10 | | | Mistakes | | | | |
| Notebook paper | 2 | | | Mistakes | | | | |
| Drafting tape | 1 | | | | | | | |
| Ruler (Metric) | 1 | | | | | | | |
| Ball point pen (any color) | 1 | | | Damage | | | | |
| Clear tape (¼ inch wide) | 1 | | | | | | | |

## PRETEST

## INSTRUCTOR'S SECTION

PART 1

1. Orthographic drawings show _____ side(s) of an object.

   a. 1
   b. 2
   c. 3
   d. 4

2. Isometric drawings show _____ side(s) of an object.

   a. 1
   b. 2
   c. 3
   d. 4

3. Orthographic drawings do not use hidden lines.

   a. true
   b. false

4. Thin lines (light lines) are used to show the visible edges of an object.

   a. true
   b. false

5. _____ lines are used to show hidden lines.

   a. thin, dashed
   b. medium, dashed
   c. medium, solid
   d. thin, solid

— continued —

## PRETEST

## INSTRUCTOR'S SECTION

PART 2

6. _____ lines are used to show imaginary lines.

   a. thin, dashed
   b. medium, dashed
   c. thick, solid
   d. thin, solid

7. To draw lines in isometric drawings, you should use a "T" square and a triangle.

   a. true
   b. false

8. Horizontal lines in orthographic drawings are at 30° in isometric drawings.

   a. true
   b. false

9. The different kinds of lines used in drafting are from _____ standards.

   a. NASA
   b. SI
   c. TLA
   d. ANSI

10. Drafting is NOT used to:

    a. design computer software
    b. map country's borders
    c. design new cars
    d. make comfortable chairs

## POSTTEST

11. Orthographic drawings show _____ side(s) of an object.

    a. 1
    b. 2
    c. 3
    d. 4

12. Isometric drawings show _____ side(s) of an object.

    a. 1
    b. 2
    c. 3
    d. 4

13. Orthographic drawings do not use hidden lines.

    a. true
    b. false

14. Thin lines (light lines) are used to show the visible edges of an object.

    a. true
    b. false

15. _____ lines are used to show hidden lines.

    a. thin, dashed
    b. medium, dashed
    c. medium, solid
    d. thin, solid

— continued —

## INSTRUCTOR'S SECTION

PART 1

## POSTTEST

## INSTRUCTOR'S SECTION

PART 2

16. _____ lines are used to show imaginary lines.

    a. thin, dashed
    b. medium, dashed
    c. thick, solid
    d. thin, solid

17. To draw lines in isometric drawings, you should use a "T" square and a triangle.

    a. true
    b. false

18. Horizontal lines in orthographic drawings are at 30° in isometric drawings.

    a. true
    b. false

19. The different kinds of lines used in drafting are from _____ standards.

    a. NASA
    b. SI
    c. TLA
    d. ANSI

20. Drafting is NOT used to:

    a. design computer software
    b. map country's borders
    c. design new cars
    d. make comfortable chairs

## POSTTEST

21. Isometric
22. Paralell
23. Orthographic
24. Three-dimensional
25. Vertikal
26. Perpendiculer
27. "T" square
28. Drafting bord
29. Horizontel
30. Diminsion

## INSTRUCTOR'S SECTION

SPELLING TEST

## EVALUATION SUMMARY

### 10 POINTS EACH:

Pretest _____

Career Search _____

### 20 POINTS EACH

Objective 1: Locate points on graph paper using the Cartesian Coordinate system and draw lines between those points. _____

Objective 2: Make and dimension orthographic drawings using ANSI line standards. _____

Objective 3: Read a rule, measure distances using your ruler, and use your drafting board and drafting tools to draw lines. _____

Objective 4: Use your drafting board, "T" square, and triangle to make and dimension isometric drawings using ANSI line standards. _____

## INSTRUCTOR'S SECTION

1. PROCESS EVALUATION

1. PROCESS EVALUATION SCORE _____

## EVALUATION SUMMARY

The instructor is encouraged to individualize the TLA to address the specific needs of each student, considering age and ability level. In addition to the specific areas on the chart below, the instructor should take into account the student's desire, enthusiasm, etc.

Evaluation based upon observed performance = 40 possible points.

### EVALUATION RATING TABLE

Student Name: _____

| Criteria | Points Possible | Points Earned |
|---|---|---|
| Neatness | 20 | _____ |
| Accuracy | 10 | _____ |
| Line weight | 10 | _____ |

— continued —

## INSTRUCTOR'S SECTION

2. PRODUCT EVALUATION

# EVALUATION SUMMARY

Use the conversion table below to convert Product Evaluation scores to percentiles.

40 = 100%
39 = 97.5
38 = 95
37 = 92.5
36 = 90

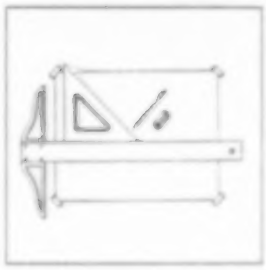
35 = 87.5
34 = 85
33 = 82.5
32 = 80

31 = 77.5
30 = 75
29 = 72.5
28 = 70

27 = 67.5
26 = 65
25 = 62.5
24 = 60

# INSTRUCTOR'S SECTION

## 2. PRODUCT EVALUATION



CONVERSION TABLE

## 2. PRODUCT EVALUATION SCORE_____

## EVALUATION SUMMARY

Posttest score = _____

## INSTRUCTOR'S SECTION

3. WRITTEN EVALUATION

3. WRITTEN EVALUATION SCORE _____

### EVALUATION WORKSHEET

1. Process evaluation score = _____
2. Product evaluation score = _____
3. Written evaluation score = _____
4. Total score = _____

Divide Total Score by 3 to find TLA score.

Total Score for TLA =

1 + 2 + 3 = Total Score

Total Score /3 = TLA SCORE

TLA SCORE _____